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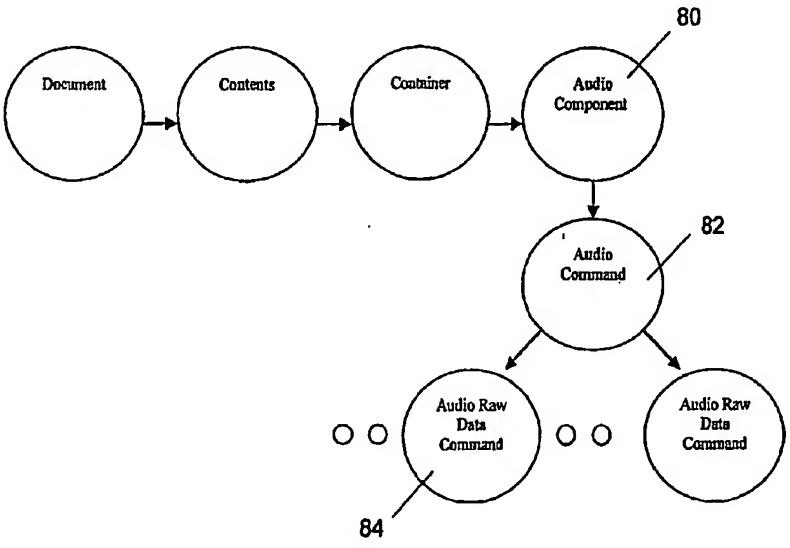
(54) Title: METHOD FOR PLAYING AUDIO FILES ON A PORTABLE ELECTRONIC DEVICE



(57) Abstract: A method of playing an audio file on a portable electronic device includes receiving the audio file as an email attachment, sending a request including a supported audio format of the portable electronic device from an attachment viewer of the portable electronic device to an attachment server to play the audio file and returning a transcoded audio file to the attachment viewer, the transcoded audio file corresponding to the audio file and having the supported audio format. The transcoded audio file may then be played by a media player of the portable electronic device.

WO 2008/013538 A1

METHOD FOR PLAYING AUDIO FILES ON A PORTABLE ELECTRONIC DEVICE

FIELD

[0001] The present disclosure relates to a method for playing audio files on a portable electronic device, in particular, audio files that are sent as email attachments.

BACKGROUND

[0002] Voicemail systems output voicemail messages in a number of different audio formats. In order to listen to a voicemail message on a portable electronic device, such as a cellular phone or a Personal Digital Assistant (PDA), for example, the portable electronic device must be equipped with an audio player that supports the audio format of the voicemail message. Similarly, audio file attachments that are received in email messages can only be played if the audio player of the portable electronic device supports the audio format of the audio attachment.

[0003] Most portable electronic devices have the ability to play only a limited number of different audio formats. In some devices, the limitation is the result of insufficient power for decoding the audio formats, while in other devices, the limitation can be attributed to the excessive cost of licensing all audio formats for different platforms. In addition, often the supported audio formats are not very compressed and therefore take up a lot of bandwidth.

SUMMARY

[0004] In one aspect there is provided a method of playing an audio file on a portable electronic device including receiving the audio file as an email attachment, sending a request from an attachment viewer of the portable electronic device to an attachment server to play the audio file, the request including a supported audio format of the portable electronic device and returning a transcoded audio file to the attachment viewer, the transcoded audio file corresponding to the audio file and having the supported audio format. The transcoded audio file is playable by a media player of the portable electronic device.

[0005] In another aspect there is provided a portable electronic device including an attachment viewer application stored in flash memory of the portable electronic device, the attachment viewer for communicating with an attachment server to request conversion of an audio email attachment into an audio format supported by the portable electronic device, and a media player for playing a transcoded audio file returned from the attachment server, the

transcoded file corresponding to the audio email attachment and having a format that is supported by the media player.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] The embodiment will be better understood with reference to the following Figures in which like numerals denote like parts and in which:

[0007] Figure 1 is a schematic diagram of a wireless communication system;

[0008] Figure 2 is a block diagram of components of a portable electronic device according to an embodiment;

[0009] Figure 3 is a flowchart depicting device side operation for playing an audio file on the portable electronic device of Figure 2;

[0010] Figure 4 is a flowchart depicting server side operation for playing an audio file on the portable electronic device corresponding to the device side flowchart of Figure 3; and

[0011] Figure 5 is a tree diagram showing the basic structure of an audio Document Object Model (DOM).

DETAILED DESCRIPTION

[0012] Referring to Figure 1, a communication system 10 for a portable electronic device 12 is generally shown. The portable electronic device 12 is operable to effect communications over a radio communications channel and communicates with a base station (not shown) while located within a coverage area that is defined by the base station. The base station is part of a wireless network that is in communication with the Internet 14. Data is delivered to the portable electronic device 12 via wireless transmission from the base station. Similarly, data is sent from the portable electronic device 12 via wireless transmission to the base station.

[0013] It will be appreciated that the portable electronic device 12 is movable within the coverage area and can be moved to coverage areas defined by other base stations. Further, as will be understood by one of ordinary skill in the art, wireless networks include GSM/GPRS, CDPD, TDMA, iDEN Mobitex, DataTAC networks, EDGE or UMTS and broadband networks such as Bluetooth and variants of IEEE 802.11.

[0014] A server 18 handles wireless client requests from the portable electronic device 12. A firewall, or proxy server, 16, is provided between the server 18 and the Internet 14. The server 18 further operates as an attachment server, which communicates with an email

client and an attachment viewer of the portable electronic device 12 to allow a user to view attachments that are received in email messages. While only one server 18 is shown for illustration purposes, a person skilled in the art will understand that the attachment server may alternatively be a separate server.

[0015] Referring now to Figure 2, a block diagram of certain components within the portable electronic device 12 is shown. In the present embodiment, the portable electronic device 12 is based on the computing environment and functionality of a wireless personal digital assistant (PDA). It will be understood, however, that the portable electronic device 12 is not limited to wireless personal digital assistants. Other portable electronic devices are possible, such as smart telephones, and laptop computers.

[0016] The portable electronic device 12 is based on a microcomputer including a processor 20 connected to a read-only-memory (ROM) 22 that contains a plurality of applications executable by the processor 20 that enables each portable electronic device 12 to perform certain functions including, for example, PIN message functions, SMS message functions and cellular telephone functions. ROM 22 is typically flash memory, however, other suitable types of ROM may alternatively be used. The processor 20 is also connected to a random access memory unit (RAM) 24 and a persistent storage device 26 which are responsible for various non-volatile storage functions of the portable electronic device 12. The processor 20 receives input from various input devices including a keypad 28. The processor 20 outputs to various output devices including an LCD display 30. A microphone 32 and phone speaker 34 are connected to the processor 20 for cellular telephone functions. The processor 20 is also connected to a modem and radio device 36. The modem and radio device 36 is used to connect to wireless networks and transmit and receive voice and data communications through an antenna 38. A content store 40, which is generally a file storage system for the portable electronic device 12, is also provided.

[0017] The portable electronic device 12 includes an attachment viewer application that is stored in flash memory 22. The attachment viewer communicates with the server 18 so that audio or image email attachments may be converted to a format that is supported by the portable electronic device and then downloaded to the attachment viewer. By converting the audio attachments to a format that is supported by the portable electronic device 12, the portable electronic device 12 does not need to support multiple formats.

[0018] For image email attachments, the attachment server first builds a Document Object Model (DOM) by parsing the attachment file. In this manner, a graph structure is built within the server representing a map of the original image. The original image is then resized based on the image size limit of the portable electronic device, or the portable electronic device display size width and height (in pixels). The afore-mentioned DOM

structure is disclosed in United States Patent Application No. 2006/0055693, which is herein incorporated by reference.

[0019] For audio attachments, device-side and server-side operations will be described with reference to Figures 3 and 4. Referring to Figure 3, when a user attempts to open an audio attachment file of an email message, the attachment viewer does not initially know that it is an audio file. Therefore, the attachment viewer makes a generic conversion request to the attachment server 18 and then checks the response from the attachment server 18, as indicated at steps 42 and 44, respectively. The response from the attachment server 18 includes the attachment file type, which is audio for audio attachments. For non-audio attachments, the file type could be document, sheet or image.

[0020] At step 45, the attachment viewer checks for streaming capability of the portable electronic device 12 using an Application Program Interface (API) call. If the portable electronic device 12 includes streaming capability, the method for playing audio files continues at step 46. If, however, the portable electronic device 12 does not include streaming capability, an error message stating that audio files are not supported is displayed, as indicated at step 47.

[0021] At step 46, the attachment viewer checks for the available Coders/Decoders (CODECs) on the portable electronic device 12 and selects the CODEC with the best compression in order to minimize bandwidth usage. The attachment viewer then makes a request to the attachment server 18 for audio data to be converted into a format that is based on the selected CODEC (step 48). Examples of destination formats include: a-Law, u-Law, MP3, GSM 610, AMR, Truespeech or other suitable formats. The original audio attachment may be any format that is embeddable within a .WAV file and includes a corresponding CODEC(s) on the attachment server 18.

[0022] At step 50, the attachment viewer receives initial audio data that has been converted from the attachment server 18. The audio data is streamed to the attachment viewer. The attachment viewer launches a media player to play the initial audio content and then checks for additional data, as indicated at steps 52 and 54. If there is additional data, the attachment viewer requests more data from the attachment server 18, as indicated at step 58. Alternatively, if there is no additional data available, the attachment viewer stops requesting audio data from the attachment server 18, as indicated at step 56.

[0023] Referring to Figure 4, at step 60, which corresponds to step 42 of Figure 3, the attachment server 18 receives a document Extensible Markup Language (XML) conversion request from the attachment viewer for the audio attachment. The attachment server 18 then builds a Document Object Model (DOM) structure for the audio attachment. The DOM is a graph structure that is built within the attachment server 18 representing a map of the

audio contents of the audio attachment file. The DOM is built using an audio distiller, which is a component of the attachment server 18. Once the DOM has been built, the attachment server 18 specifies the audio attachment type in the response to the attachment viewer, as indicated at step 62, which corresponds to step 44 of Figure 3.

[0024] Audio DOM structure, which includes an audio component 80, is generally shown in Figure 5. It will be appreciated by a person skilled in the art that the audio DOM is similar to the DOM, which is described in United States Patent Application No. 2006/0055693, however, an audio command 82 and an audio raw data command 84 are provided in the audio DOM. The audio command 82 contains attributes of the original audio file including: format of the audio file, number of channels (mono or stereo), average bytes per second and sample rate, for example. Each audio raw data command 84 contains a fixed size chunk of the original raw audio data. The raw audio data is typically segmented in chunks of 1,000 bytes.

[0025] At step 64, which corresponds to step 48 of Figure 3, the attachment server 18 receives an audio XML conversion request from the attachment viewer. The attachment server 18 then parses the XML request, at step 66, in order to determine which audio format the audio attachment is to be transcoded into. At step 68, the attachment server 18 checks if the requested audio format data has previously been cached. The DOM of the requested audio format will be cached by the attachment server 18 along with the DOM representing the original audio attachment when an audio attachment is played by the attachment viewer.

[0026] If a cached audio component exists for the requested format, the attachment server 18 retrieves the cached audio component, as indicated at step 70. Alternatively, if the requested audio format is not already cached, the attachment server 18 traverses through the initial DOM that was built by the audio distiller and collects the original audio data, as indicated at step 72. The attachment server then transcodes the collected original audio data into the requested audio format and builds a new audio component from the transcoded audio data, as indicated at steps 74 and 76, respectively. Once built, the attachment server 18 caches the new audio component. The attachment server then encapsulates the audio data in Universal Content Stream (UCS) format and sends the UCS content to the attachment viewer, as indicated at step 78, which corresponds to step 50 of Figure 3.

[0027] The construction of the new audio component is similar to the construction of the original audio attachment DOM. The new audio component contains audio data corresponding to the original audio data, but usually consumes much less memory. In order to optimize performance, the attachment server 18 caches this new audio component together with the original DOM structure. Therefore, for the subsequent requests, audio data will be retrieved from the cache.

[0028] The method for playing audio files allows users to listen to audio attachments that are received by the portable electronic device 12 in email messages. This is useful for voicemail messaging services, for example, that automatically forward voicemail messages, which are recorded on a voicemail server, as audio attachments in email messages.

[0029] The method minimizes bandwidth utilization because the attachment server 18 transcodes the original uncompressed audio into the requested compressed format, and also re-samples the audio into speech quality. Further, the disclosed method minimizes the need for having multiple CODEC(s) on the portable electronic device. Even if the original audio format of the file is not supported, the attachment server 18 transcodes the original audio file into a format that is supported by the device platform, which results in significant reduction in cost.

[0030] A specific embodiment has been shown and described herein. However, modifications and variations may occur to those skilled in the art. All such modifications and variations are believed to be within the sphere and scope of the present embodiment.

CLAIMS

What is claimed is:

1. A method for playing an audio file on a portable electronic device comprising:

receiving said audio file as an email attachment;

sending a request from an attachment viewer of said portable electronic device to an attachment server to play said audio file, said request notifying said attachment server of a supported audio format of said portable electronic device; and

sending a transcoded audio file from said server to said attachment viewer, said transcoded audio file corresponding to said audio file and having said supported audio format;

wherein said transcoded audio file is playable by a media player of said portable electronic device.

2. A method as claimed in claim 1, further comprising building a graph structure representing said audio file prior to transcoding said audio file, said graph structure being stored on said attachment server.

3. A method as claimed in claim 1, wherein said transcoded audio file is sent to said attachment viewer using a streaming method.

4. A method as claimed in claim 1, wherein said supported audio format corresponds to a coder/decoder of the portable electronic device.

5. A method as claimed in claim 4, wherein multiple coders/decoders are available on said portable electronic device and said supported audio format corresponds to a selected coder/decoder, said selected coder/decoder having better compression than others of said multiple coders/decoders.

6. A method as claimed in claim 2, wherein said graph structure representing said audio file is cached on said attachment server along with a graph structure representing said transcoded audio file.

7. A portable electronic device comprising:

an attachment viewer application stored in flash memory of said portable electronic device, said attachment viewer for communicating with an attachment server to request conversion of an audio email attachment into an audio format supported by said portable

electronic device;

a media player for playing a transcoded audio file returned from said attachment server, said transcoded file corresponding to said audio email attachment and having a format that is supported by said media player.

8. A portable electronic device as claimed in claim 7, wherein a graph structure representing said audio file is built prior to transcoding said audio file, said graph structure being stored on said attachment server.

9. A portable electronic device as claimed in claim 7, wherein said transcoded audio file is sent to said attachment viewer using a streaming method.

10. A portable electronic device as claimed in claim 7, wherein said audio format supported by said portable electronic device corresponds to a coder/decoder of the portable electronic device.

11. A portable electronic device as claimed in claim 10, wherein multiple coders/decoders are available on said portable electronic device and said aid audio format supported by said portable electronic device corresponds to a selected coder/decoder, said selected coder/decoder having better compression than others of said multiple coders/decoders.

12. A portable electronic device as claimed in claim 8, wherein said graph structure representing said audio file is cached on said attachment server along with a graph structure representing said transcoded audio file.

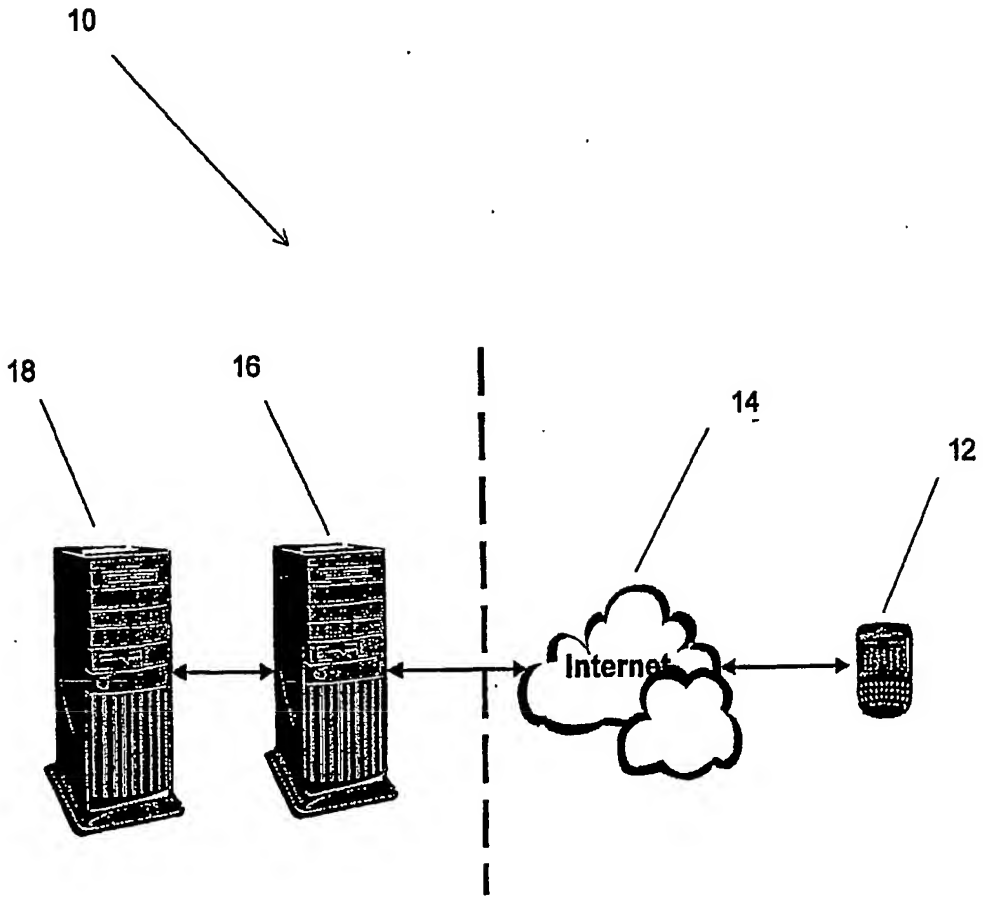


Fig. 1

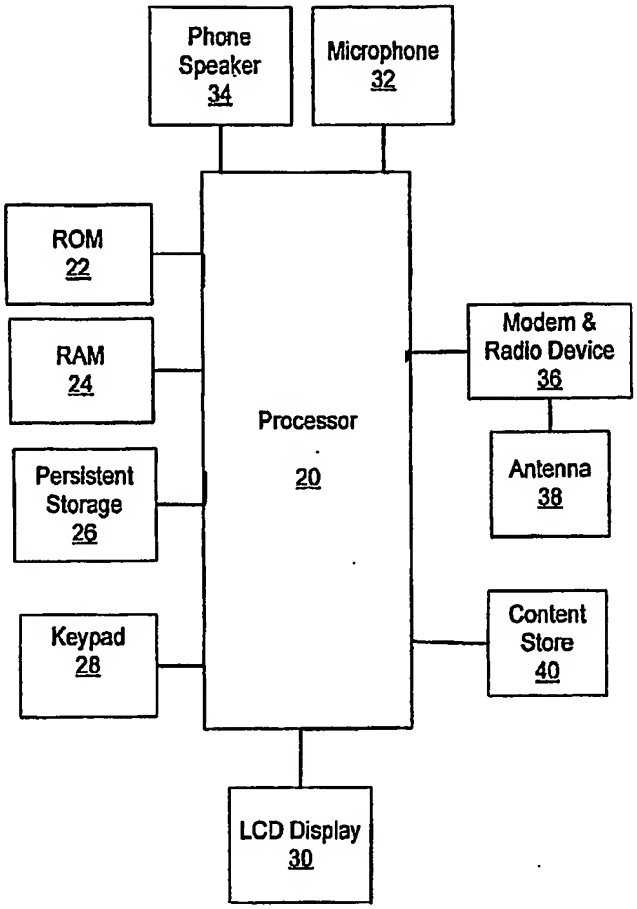

Phone Speaker 34
Microphone 32
ROM 22
RAM 24
Persistent Storage 26
Keypad 28
Processor 20
Modem & Radio Device 36
Antenna 38
Content Store 40
LCD Display 30

Fig. 2

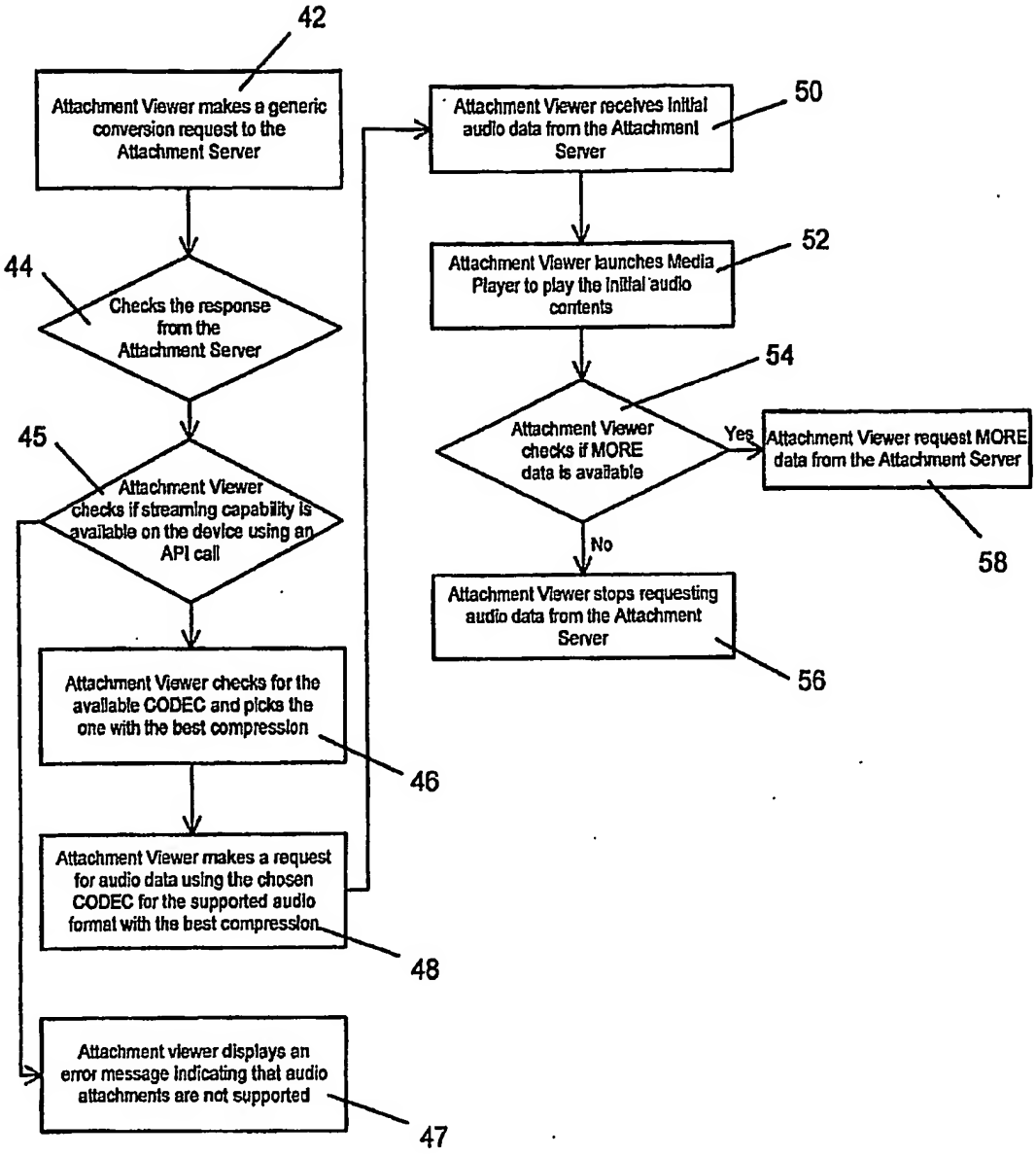

42
Attachment Viewer makes a generic conversion request to the Attachment Server
44
Checks the response from the Attachment Server
45
Attachment Viewer checks if streaming capability is available on the device using an API call
Attachment Viewer checks for the available CODEC and picks the one with the best compression
46
Attachment Viewer makes a request for audio data using the chosen CODEC for the supported audio format with the best compression
48
Attachment viewer displays an error message indicating that audio attachments are not supported
47
Attachment Viewer receives initial audio data from the Attachment Server
50
Attachment Viewer launches Media Player to play the initial audio contents
52
54
Attachment Viewer checks if MORE data is available
Yes
Attachment Viewer request MORE data from the Attachment Server
58
No
Attachment Viewer stops requesting audio data from the Attachment Server
56

Fig. 3

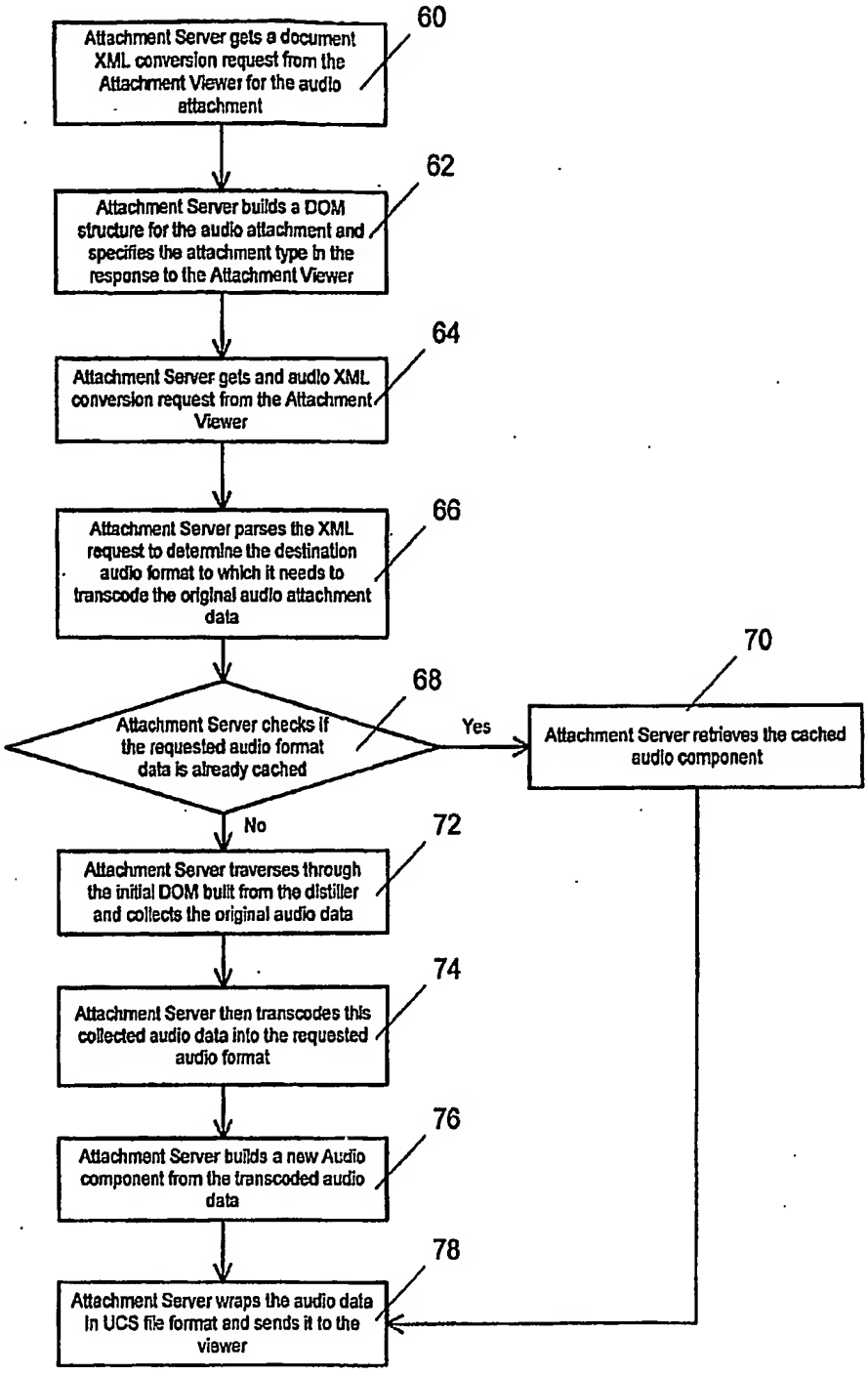

Attachment Server gets a document XML conversion request from the Attachment Viewer for the audio attachment
60
Attachment Server builds a DOM structure for the audio attachment and specifies the attachment type in the response to the Attachment Viewer
62
Attachment Server gets and audio XML conversion request from the Attachment Viewer
64
Attachment Server parses the XML request to determine the destination audio format to which it needs to transcode the original audio attachment data
66
Attachment Server checks if the requested audio format data is already cached
68
Yes
Attachment Server retrieves the cached audio component
70
No
Attachment Server traverses through the initial DOM built from the distiller and collects the original audio data
72
Attachment Server then transcodes this collected audio data into the requested audio format
74
Attachment Server builds a new Audio component from the transcoded audio data
76
Attachment Server wraps the audio data in UCS file format and sends it to the viewer
78

Fig. 4

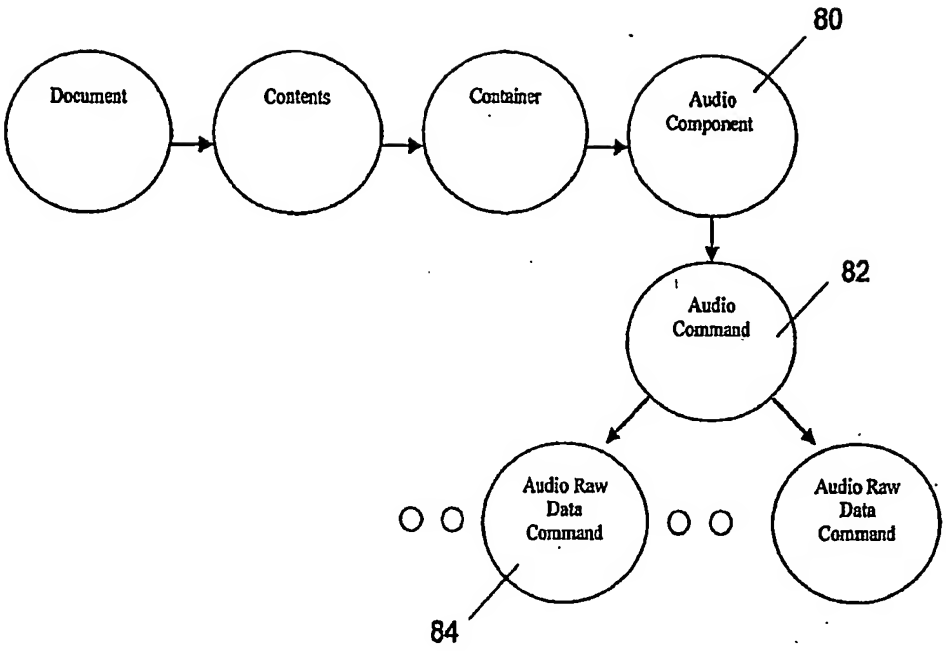

80
Document
Contents
Container
Audio Component
82
Audio Command
Audio Raw Data Command
Audio Raw Data Command
84

Fig. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 06/29208

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - H04M 11/08 (2007.01)
USPC - 379/67.1
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
USPC: 379/67.1;

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC: 369/24.01, 30.48; 307/149; 340/825.24, 825.25

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PubWest(USPT,PGPB,EPAB,JPAB)
Search Terms: audio, email, portable, attachment, multimedia messaging service

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2005/0207390 A1 (SOHEILLI et al.) 22 September 2005 (22.09.2005), para [0030] and claims 20, 22	1-12
Y	US 2004/0258063 A1 (RAITH et al.) 23 December 2004 (23.12.2004), para [0052], claims 15, 32, and FIG. 1	1-12

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"B" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
03 February 2007 (03.02.2007)	05 MAR 2007
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

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